

Vita
J. Gregory Trafton

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Education:

Princeton University, 1989–1994. Ph.D in Psychology, June 1994.
Princeton University, 1989–1991. M.A. in Psychology, 1991.
Trinity University, 1985–1989. B.S. in Computer Science; second major in Psychology, 1989.

Positions Held:

1995–present: Engineering Research Psychologist for the Naval Research Laboratory
1995–present: Affiliate/Adjunct Professor at George Mason University
1993–1994: Research Scientist for NTI, Inc., Brooks Air Force Base
1989–1993: Research Assistant to Brian J. Reiser, Department of Psychology, Princeton University.
1987–1989: Research Assistant to Stanley B. Klein, Department of Psychology, Trinity University.

Professional Affiliations:

Cognitive Science Society
American Education Research Association
AI & Ed

Computer Languages Known:

LISP, Prolog, Java, C, C++, Tcl/Tk, Pascal, Fortran, Cobol, APL, PL/I.

Research Interests:

The Cognition of Complex Visualizations (Scientific Visualizations, Meteorology), Interruptions, Graph Comprehension, Cognitive Modeling, Problem Solving, Intelligent Tutoring Systems, Learning, Transfer, and The Interaction between Learning Environments and HCI.

Teaching Experience:

Scientific Visualization (GMU)
An Introduction to Cognitive Science (GMU)
Learning Environments and HCI (GMU)
Graduate Statistics (Princeton T.A.)
Artificial Intelligence and Human Cognition (Princeton T.A.)
Artificial Intelligence and Education (Princeton T.A.)
Artificial Intelligence (Princeton T.A.)
Introduction to Psychology (Princeton T.A.)

Funding

Agent-Based Architectures. Office of Naval Research. 600K over 3 years (1997-1999). Aha, D., Ballas, J., & Trafton, J. G.
Improved Human System Process for METOC. Office of Naval Research. 60K. (1999). Ballas, J., & Trafton, J. G.
Spatial Transformations. Office of Naval Research. 31K (1999). Trafton, J. G.
Language Understanding for Interactive Knowledge Management Naval Research Laboratory/Office of Naval Research. 550K over 2 years (1999-2000). Marsh, E., & Trafton, J. G.
Human Centered Scientific Visualization. Naval Research Laboratory/Office of Naval Research. 650K over 3 years (2000-2002). Trafton, J. G.

Learning new knowledge structures in a cognitive model. Office of Naval Research. 480K over 3 years (2000-2002). Schultz, A. C., & Trafton, J. G.

METOC Human-System Interaction Improvement. Office of Naval Research. 610K over 5 years (2000-2004). Ballas, J., & Trafton, J. G.

Managing Attention in Critical Event Systems. Office of Naval Research. 250K (2000). Schmidt-Nielsen, A., Ballas, J., & Trafton, J. G.

Managing Attention in Critical Event Systems. Office of Naval Research. 125K (2001). Trafton, J. G., & Ballas, J.

Publications:

Altmann, E. M. & Trafton, J. G. (in press). An Activation-Based Model of Memory for Goals. *Cognitive Science*.

Trafton, J. G. & Trickett, S. B. (2001). Note-Taking for self-explanation and problem solving. *Human Computer Interaction*. 16(1), 1-38. [Lead Article]

Trafton, J. G., Kirschenbaum, S. S., Tsui, T. L., Miyamoto, R. T., Ballas, J. A., & Raymond, P. D. (2000). Turning Pictures into Numbers: Extracting and Generating Information from Complex Visualizations. *International Journal of Human Computer Studies* 53 (5), 827-850.

Brock, D. & Trafton, J. G. (1999). Cognitive representation of common ground in user interfaces. In Judy Kay (Ed.), *User Modeling*, New York, NY: Springer-Wien.

Lipps, A. W., Trafton, J. G., & Gray, W. D. (1998). Animation as documentation: A replication with reinterpretation. *Intercom*, 7, 199-201.

Trafton, J. G. (1995). A hybrid model using neural networks and ACT-R. *Behavior Research Methods, Instruments, and Computers*, 27 (2), 183-186.

- Trafton, J. G. (1994). The contributions of studying examples and solving problems to skill acquisition. Ph.D thesis: Department of Psychology, Princeton University, Princeton, NJ.
- Klein, S. B., Loftus, J., Trafton, J. G., & Fuhrman, R. W. (1992). The use of exemplars and abstractions in trait judgments: A model of trait knowledge about the self and others. *Journal of Personality and Social Psychology*, 63, 739–753.
- Merrill, D. C., Reiser, B. J., Ranney, M., & Trafton, J. G. (1992). Effective pedagogical strategies in human tutors and intelligent tutoring systems. *Journal of the Learning Sciences*, 2, 277–306.

Conference Presentations, Papers, and Technical Reports:

- Bugasjska, M. D., Schultz, A. C., Trafton, J. G., Gittens, S., & Mintz, F. (in press). Building adaptive computer generated forces: The effect of increasing task reactivity on human and machine control abilities. GECCO01.
- Trafton, J. G. (2001). Spatial Transformations. Invited presentation at the Psychology Department of Mississippi State University. Mississippi State, MS.
- Trafton, J. G. (2000). Turning Pictures into Numbers: The use of Complex Visualizations. Invited presentation at Engineering Research Council of Mississippi State University. Mississippi State, MS.
- Trafton, J. G., Trickett, S. B., & Mintz, F. (in press). Overlaying Images: Spatial Transformations of Complex Visualizations. Model Based Reasoning '01.
- Trafton, J. G., & Trickett, S. B. (in press). A new model of graph and visualization usage. *The proceedings of the twenty-third annual conference of the cognitive science society*
- Trickett, S. B., Trafton, J. G., Schunn, C. D., & Harrison, A. (in press). "That's Odd!" How Scientists Respond to Anomalous Data. *The proceedings of the twenty-third annual conference of the cognitive science society*

- Trafton, J. G., Schultz, A. C., & Gittens, S. (2001). A Hybrid Cognitive and Reactive Architecture. *The 10th Conference on Computer Generated Forces and Behavioral Representation*.
- Lanzagorta, M. O., Rosenberg, R., & Trafton, J. G. (2001). Cognitive processes in scientific visualization. *The proceedings of the International Society for Optical Engineering 2001*.
- Trafton, J. G. (2001). Spatial Transformations. Invited presentation at the Psychology Department of George Mason University. Fairfax, VA.
- Trafton, J. G. (2000). Predicting Complex Information Using Qualitative Mental Models. *Human Performance, Situation Awareness, and Automation: User-Centered Design for the New Millennium*, 18–19.
- Schultz, A. C., & Trafton, J. G. (2000). A Hybrid Cognitive and Reactive Architecture. Presented at AAAI.
- Trickett, S. B., Fu, W., Schunn, C. D., & Trafton, J. G. (2000). From Dipsy-Doodles to Streaming-Motions: Changes in Representation in the Analysis of Visual Scientific Data. *The proceedings of the twenty-second annual conference of the cognitive science society*.
- Trickett, S. B., Trafton, J. G., & Schunn, C. D. (2000). Blobs, Dipsy-Doodles and Other Funky Things: Framework Anomalies in Exploratory Data Analysis. *The proceedings of the twenty-second annual conference of the cognitive science society*.
- Altmann, E. M. & Trafton, J. G. (2000). Prospective memory: Proactive, reactive, or both? Invited presentation at NASA.
- Trafton, J. G. (2000). Using Usability. Presented at the Distributed Autonomous Systems Workshop, Naval Research Laboratory. Washington, DC.
- Trafton, J. G. (2000). Turning Pictures into Numbers: The use of Complex Visualizations. Invited presentation at the Psychology Department of George Mason University. Fairfax, VA.

- Schunn, C. D., Trickett, S. B., & Trafton, J. G. (1999). What gestures reveal about the scientist's mind: Data Analyses of Data Analyses. Use of Gestures in Scientific Discovery. Invited Presentation at the Krasnow Institute of George Mason University. Fairfax, VA.
- Schunn, C. D., Trickett, S. B., Trafton, J. G., & Seeley, G. (1999). Sifting through Masses of Observational Data: Children and Professional Astronomers. Invited symposium talk presented at the 1st Meeting of the Cognitive Development Society. Chapel Hill, NC.
- Trafton, J. G. (1999). Spatial Transformations. Invited Presentation at the ONR Workshop on Sonar Visualizations (core presenter). NUWC, RI.
- Trafton, J. G. (1999). What's in a goal? Panel organizer. *Proceedings of the 6th annual ACT-R workshop*.
- Altmann, E. M. & Trafton, J. G. (1999). Functional encoding in memory for goals. *Proceedings of the 6th annual ACT-R workshop*.
- Altmann, E. M. & Trafton, J. G. (1999). Memory for goals: An architectural perspective. *The proceedings of the twenty-first annual conference of the cognitive science society*.
- Miller, S. L., & Trafton, J. G. (1999). Natural language and direct manipulation search tools in a multimodal information system. *Proceedings of ACM CHI'99 Conference on Human Factors in Computing Systems*.
- Miller, S. L., & Trafton, J. G. (1999). Improving information search using natural language and direct manipulation tools in a multimodal interface. *HFES 43rd Annual Meeting*.
- Trickett, S. B. & Trafton, J. G. (1999). Note-taking as a strategy for learning (pp. 742-748). *The proceedings of the twenty-first annual conference of the cognitive science society*.
- Trickett, S. B. & Trafton, J. G. (1999). Learning and transfer of systematicity. *Poster presented at the twenty-first annual conference of the cognitive science society*.

- Trickett, S. B., Trafton, J. G., & Raymond, P. D. (1998). Exploration in the experiment space: The relationship between systematicity and performance (pp. 1067-1072). *The proceedings of the twentieth annual conference of the cognitive science society*.
- Lipps, A. W., Katz, I., R., & Trafton, J. G. (1998). Factors affecting difficulty of generate and test in algebra problem solving. *Virginia Academy of Science*.
- Lipps, A. W., Katz, I., R., & Trafton, J. G. (1998). Role of solution space in generating examples problems. *Psychonomic Society*.
- Lipps, A. W., Trafton, J. G., & Gray, W. D. (1998). Animation as documentation: A replication with reinterpretation. *The 1998 Society for Technical Communication*.
- Trafton, J. G., Wauchope, K., Raymond, P. D., Deubner, B., Stroup, J., & Marsh, E. (1997). How natural is natural language for Intelligent Tutoring Systems? *The proceedings of the nineteenth annual conference of the cognitive science society*.
- Trafton, J. G., Wauchope, K., & Stroup, J. (1997). Errors and usability of natural language in a multimodal system. *The proceedings of the 15th International Joint Conference on Artificial Intelligence (IJCAI-97)*.
- Trafton, J. G. (1996). Alphabet Arithmetic and ACT-R: A reply to Rabinowitz and Goldberg. *The proceedings of the eighteenth annual conference of the cognitive science society*.
- Brock, D. & Trafton, J. G. (1996). A preliminary architecture for the implementation of task model tracing. *Third Annual ACT-R Workshop Proceedings*.
- Airth, M. E. & Trafton, J. G. (1996). An evaluative assessment of APPEX. Naval Research Laboratory.
- Brock, D., Hix, D., Dievendorf, L., & Trafton, J. G. (1995). Extending the user action notation for research in individual differences. *Proceedings of the Human Factors and Ergonomics Society 39th Annual Meeting*.

- Sandoval, W. A., Trafton, J. G., & Reiser, B. J. (1995). The Effects of Self-Explanation on Studying Examples and Solving Problems. *The proceedings of the seventeenth annual conference of the cognitive science society*.
- Trafton, J. G. (1995). DACSF: A methodology for creating synthetic tasks. Technical Report: AL/CF-TR-1995-0020. Brooks Air Force Base.
- O'Donnell, B., Eddy, D., Cardenas, B., Trafton, J. G., & Campbell, J. (1995). Development of the situation awareness flight training and simulation evaluation (SAFTE) system: Definition of situation awareness measures and initial development of the flight simulator. Technical Report: AL/CF-TR-1995-0039. Brooks Air Force Base.
- Trafton, J. G. (1994). Studying Examples and Solving Problems: A comparison of two models Rice University, Houston, TX.
- Trafton, J. G. (1994). A hybrid model using neural networks and ACT-R. Annual meeting of the Society for Computers in Psychology.
- Reiser, B. J., Merrill, D., Neel, K., Ranney, M., & Trafton, J. G. (1994). Reasoning-Congruent Learning Environments and Explanatory Guidance: Theory and Results of the GIL Tutoring Project. *Annual Meeting of the American Educational Research Association*.
- Trafton, J. G., & Reiser, B. J. (1993). The contributions of studying examples and solving problems to skill acquisition. *The proceedings of the fifteenth annual conference of the cognitive science society* (pp. 1017–1022). Hillsdale, NJ: Erlbaum.
- Trafton, J. G. (1992). The Role of Examples in Learning. Educational Testing Service, Princeton, NJ
- Reiser, B. J., Beekelaar, R., Hamid, A., Handleman, E., Wurmser, C., Tyle, A., Bednarsh, A., Ranney, M., Merrill, D., & Trafton, J. G. (1992). GIL: Scaffolding Learning to Program with Reasoning-Congruent Representations and Model Tracing Guid-

ance. *Intelligent Tutoring Systems: Second International Conference, ITS '92*.

- Merrill, D. C., Reiser, B. J., Ranney, M., & Trafton, J. G. (1991). Effective pedagogical techniques in human tutors and intelligent tutoring systems. Technical Report No. 51, Cognitive Science Laboratory, Princeton University, Princeton, NJ.
- Trafton, J. G., & Reiser, B. J. (1991). Providing natural representations to facilitate novices' understanding in a new domain: Forward and backward reasoning in programming. *The proceedings of the thirteenth annual conference of the cognitive science society* (pp. 923–927). Hillsdale, NJ: Erlbaum.

Reviewer for:

Program Committee for *The Fourth International Conference on Cognitive Modeling (ICCM, 2001)*

Ad hoc reviewer for *ACM Transactions on Computer-Human Interaction*

Ad hoc reviewer for *Human Computer Interaction*

Ad hoc reviewer for *International Journal of Human Computer Studies*

Ad hoc reviewer for *Instructional Science*

Program committee for *ITS '98*

Various proceedings of the *Annual conference of the cognitive science society*

Various proceedings of the *Proceedings of ACM CHI Conference on Human Factors in Computing Systems*